

REMARKS

By the present Amendment and Response, independent claims 1 and 10 have been amended, and new dependent claims 28-31 have been added. Thus, claims 1-5, 7-13, 15-18 and 28-31 are pending in the present application. Reconsideration and allowance of pending claims 1-5, 7-13, 15-18 and 28-31 in view of the following remarks are requested.

A. Rejection of Claims 1-5, 7-13 and 15-18 under 35 USC §102(e)

The Examiner has rejected claims 1-5, 7-13 and 15-18 under 35 USC §102(e) as being anticipated by Zhao et al. (USPN 6,627,539) (“Zhao”). First, applicants respectfully submit that although the Examiner’s rejection states that claims 1-5, 7-13 and 15-18 are rejected under 35 USC §102(b), applicants have noted that the proper rejection would fall under 35 USC §102(e), since the present application was pending at the time of issuance of Zhao on September 30, 2003.

For the reasons discussed below, applicants respectfully submit that claim 10, as amended, is patentably distinguishable over Zhao. Claim 10, as amended, recites: “a first interconnect metal layer; a first intermetallic dielectric layer situated over said first interconnect metal layer; a metal resistor situated over said first intermetallic dielectric layer, said metal resistor not being connected to said first interconnect metal layer; a dielectric cap layer patterned on said metal resistor; a second intermetallic dielectric layer

formed over said dielectric cap layer and said metal resistor; a second interconnect metal layer over said second intermetallic dielectric layer; a first intermediate via connected to a first terminal of said metal resistor and said second interconnect metal layer; a second intermediate via connected to a second terminal of said metal resistor and said second interconnect metal layer.”

As disclosed in the present application, the present invention achieves a metal resistor that can be advantageously added to a standard aluminum backend process used in IC chip fabrication without impacting or disturbing the aluminum backend process flow. For example, a standard two-step dielectric deposition process can accommodate the patterning of the present invention’s metal resistor on a first intermetallic dielectric layer followed by depositing a second intermetallic dielectric layer over the metal resistor. Also, the invention’s novel scheme of accommodating the standard two-step dielectric deposition to integrate the invention’s metal resistor between two interconnect metal layers does not significantly increase via etch depth, and thus advantageously results in a simplified via etch process.

As shown in Fig. 11 of the present application, metal resistor 26 is not connected to first interconnect metal layer (12,14), but metal resistor 26 is connected to second interconnect metal layer (42,44) through vias 32 and 34. This is significant for metal resistor 26 to function as a resistive component, rather than an interconnect as in bulk metal 220 in Zhao. Unlike metal resistor 26 of the present application, Zhao shows that

metal 220 is connected to metal 204, which is situated below metal 220. Accordingly, claim 10 is patentably distinguishable over Zhao and, thus, claim 10 and its dependent claims 11-13, 15-18 and 30-31 should be allowed.

Furthermore, by the present amendment, applicants have added new dependent claim 30, which depends from claim 10. Dependent claim 30 recites: “said metal resistor is not connected from below.” As discussed above, the limitation of claim 30 provides a further distinction over Zhao, which discloses that metal 220 is connected to metal 204, which is situated below metal 220.

In addition, by the present amendment, applicants have added new dependent claim 31, which depends from claim 10. Dependent claim 31 recites: “the thickness of said metal resistor is approximately 100.0 Angstroms to 1500.0 Angstroms.” As disclosed in Zhao, however, interconnect metal 220 is 1.2-2.0 microns in thickness. (Col. 6, lines 40-42.) Accordingly, the limitation of claim 31 further signifies metal resistor 26 of the present application being utilized as a resistive component, unlike metal 220 of Zhao, which is used an interconnect component.

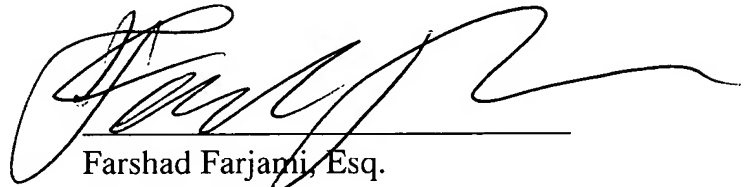
Applicants respectfully submit that claim 1 has been amended to have a limitation similar to that of claim 10 by reciting “said metal resistor not being connected to said first interconnect metal layer.” Accordingly, claim 1 is patentably distinguishable over Zhao at least for the same reasons stated above in conjunction with patentability of claim 10 and, thus, claim 1 and its dependent claims 2-5, 7-9 and 28-29 should be allowed. New

dependent claims 28-29, which depend from claim 1, include the same limitations as new dependent claims 30-31, respectively.

B. Conclusion

Based on the foregoing reasons, the present invention, as defined by amended independent claims 1 and 10 and claims depending therefrom, is patentably distinguishable over the art cited by the Examiner. Applicants respectfully request an early allowance of claims 1-5, 7-13, 15-18 and 28-31 pending in the present application.

Respectfully Submitted;
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